CLAIMS

1. A method of generating a reliability value ($L_{k,m}$) for a received multilevel signal (r) in relation to a number of predetermined signal symbols ($S_1,...,S_M$) each associated with a corresponding bit sequence including a first bit position (m); the reliability value being indicative of likelihood information of receiving said multilevel signal; the method comprising:
- identifying (502; 802) a first one ($\check{s}_k$) of the number of signal symbols as being closest to the received multilevel signal; and
- estimating (506, 507; 804, 805) the reliability value based on a stored pre-computed distance function of at least the first signal symbol and a second one ($\check{s}_k$) of the number of signal symbols, where the second signal symbol is the signal symbol closest to the first signal symbol of the signal symbols corresponding to a different binary value at the first bit position of the respective associated bit sequence than the first signal symbol.

2. A method according to claim 1, characterised in that the stored pre-computed distance function is one of a number of functional relations between the received multilevel signal and the reliability value, and the step of estimating the reliability value further comprises the step of selecting (804) a functional relation of said number of functional relations dependant on the first signal symbol and the first bit position.

3. A method according to claim 1, characterised in that the stored pre-computed distance function comprises a second distance (δ_3) between the first signal symbol and the second signal symbol, and the step of estimating the reliability value further comprises the step of determining (503) a first distance (δ_1) between the received signal and the first signal symbol.

4. A method according to claim 3, characterised in that the step of estimating the reliability value comprises the step of determining (506, 507) a polynomial function of the first distance and the second distance, multiplied by a predetermined constant (K).

5. A method according to claim 4, characterised in that the predetermined constant is selected depending on the noise distribution of the received multilevel signal.

5   6. A method according to claim 1, characterised in that the stored pre-computed distance function comprises approximations of reliability values for each signal symbol and bit position.

7. A method according to any one of the claims 1 through 6, characterised in
10   that the stored pre-computed distance function is stored in a look-up table (508; 808) comprising a plurality of pre-computed distance functions indexed by the number of signal symbols and the bit positions of the number of bit sequences.

15   8. A method according to any one of the claims 1 through 7, characterised in that the method further comprises the step of providing the reliability value as an input to a decoder (106).

9. A method according to any one of the claims 1 through 8, characterised in
20   that the first signal symbol is identified by means of a slicer.

10. A method according to any one of the claims 1 through 9, characterised in that the likelihood information comprises a log-likelihood ratio.

25   11. A method according to any one of the claims 1 through 10, characterised in that the step of identifying the first signal symbol as being closest to the received multilevel signal comprises the step of identifying the first signal symbol as being closest to the received multilevel signal with respect to a Euclidean distance measure in a signal space.
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12. A method according to claim 11, characterised in that the signal space is related to the complex plane in quadrature amplitude modulation.

13. A method according to any one of the claims 1 through 12, characterised
35   in that the number of predetermined signal symbols consist of M signal

symbols of a quadrature amplitude modulation scheme, where M is a power of 2 and larger than 2.

14. A method according to any one of the claims 1 through 13, characterised in that the number of signal symbols are associated with the number of bit sequences such that the bit sequences associated with all nearest neighbours of each signal symbol only differ from the bit sequence of that signal symbol at one bit position.

15. An arrangement for generating a reliability value ($L_{k,m}$) for a received multilevel signal (r) in relation to a number of predetermined signal symbols ($S_1,...,S_M$) each associated with a corresponding bit sequence including a first bit position (m); the reliability value being indicative of likelihood information of receiving said multilevel signal; the arrangement comprising

- first processing means (104) adapted to identify a first one of the number of signal symbols as being closest to the received multilevel signal;

- storage means (105) adapted to store a pre-computed distance function of at least the first signal symbol and a second one of the number of signal symbols, where the second signal symbol is the signal symbol closest to the first signal symbol of the signal symbols corresponding to a different binary value at the first bit position of the respective associated bit sequence than the first signal symbol; and

- second processing means (104) adapted to estimate the reliability value on the basis of the stored pre-computed distance function.

16. An arrangement according to claim 15, characterised in that the stored pre-computed distance function is indicative of one of a number of functional relations between the received multilevel signal and the reliability value; and that the second processing means is further adapted to select a functional relation of said number of functional relations dependant on the first signal symbol and the first bit position.

17. An arrangement according to claim 15, characterised in that the stored pre-computed distance function is a second distance between the first signal symbol and the second signal symbol; and that the second processing

means is further adapted to determine a first distance between the received signal and the first signal symbol.

18. An arrangement according to claim 17, characterised in that the second processing means is further adapted to determine a polynomial function of the first distance and the second distance, multiplied by a predetermined constant.

19. An arrangement according to claim 18, characterised in that the predetermined constant is selected depending on the noise distribution of the received multilevel signal.

20. An arrangement according to claim 15, characterised in that the stored information comprises approximations of reliability values for each signal symbol and bit position.

21. An arrangement according to any one of the claims 15 through 20, characterised in that the storage means is adapted to store a plurality of pre-computed distance functions in a look-up table indexed by the number of signal symbols and the bit positions of the number of bit sequences.

22. An arrangement according to any one of the claims 15 through 21, characterised in that the first processing means further comprises a slicer.

23. An arrangement according to any one of the claims 15 through 22, characterised in that the likelihood information comprises a log-likelihood ratio.

24. An arrangement according to any one of the claims 15 through 23, characterised in that the first processing means is further adapted to identify the first signal symbol as being closest to the received multilevel signal with respect to a Euclidean distances in a signal space.

25. An arrangement according to claim 24, characterised in that the signal space is related to the complex plane in quadrature amplitude modulation.

26. An arrangement according to any one of claims 15 through 25, characterised in that the number of predetermined signal symbols consist of M signal symbols of a quadrature amplitude modulation scheme, where M is a power of 2 and larger than 2.

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27. An arrangement according to any one of the claims 15 through 26, characterised in that the number of signal symbols are associated with the number of bit sequences such that the bit sequences associated with all nearest neighbours of each signal symbol only differ from the bit sequence of that signal symbol at one bit position.

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28. A device (103) for receiving multilevel signals comprising an arrangement according to any one of the claims 15 through 27.

15   29. A device according to claim 28, characterised in that the device further comprises a decoder (106) adapted to receive an input signal from the arrangement indicative of the determined reliability value.

30. A device according to claim 28 or 29, characterised in that the device is a
20   mobile terminal.